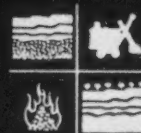




The Coal Situation



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THE PACIFIC RIM COAL MARKETS: COMPETITORS' STRENGTHS AND WEAKNESSES

Editor's Note:

The following analysis by James M. Griffin, Vice President and Technical Director, Chase Manhattan Bank, is a condensed version of a paper he presented at the First International Fall Meeting of the Society of Mining Engineers of AIME, September, 1982. Jim is a mining engineer responsible for the technical assessment of coal projects in Chase's Mining and Metals Division. Copies of the original paper are available upon request.

A coal reserve's size, location, quality, and geology are important factors in determining its economic attractiveness. Of these four, size is least important. Note, however, that all four aspects are uncontrollable. A mine operator must work with these factors to his best advantage.

Let us turn our attention to the major export regions for the Pacific Rim and compare the relative strengths of each in terms of quality, location, and mining conditions.

Australia

It is impressive that 99 percent of the Queensland and New South Wales bituminous coals contain less than 1 percent sulfur. In general, Queensland coking coals are superior to those of New South Wales, although coking and steaming coals are being exported from both states. New South Wales' coals tend to run from a higher to a lower volatile content as one progresses from the north to the south of Sydney. Typical coal qualities on an air-dried basis are:

Heating Value	11,000	—	12,500 BTU/lb.
Moisture	1%	—	3%
Ash	7%	—	14%
Volatile Matter	20%	—	35%
Sulfur	0.3%	—	0.8%
CSN or FSI	6	—	8

Variations over such a large geographical area are great, but the low sulfur and ash contents of these coals and their high heating values make them very acceptable on the international market.

Australia's reserves are located close to coastal tidewaters. This is a major reason for Australia's competitiveness. Unfortunately, due to government control of rail in most countries, it is not possible to make a direct comparison of rail costs between regions solely on the basis of distance. This subject is beyond the scope of this report, other than to note that the structure of the rail industry often has a greater effect on tariffs than the distances involved. In short, government-established rail rates are not necessarily related to actual costs. This does not negate the importance of distance, but does complicate comparisons.

Inspection of the locations of projected new mines in both Queensland and New South Wales shows that proximity to tidewater will continue to be an advantage for Australia. Over

50 percent of production will continue to come from mines located within 150 kilometers of export terminals, and the remainder will be within 400 kilometers. Furthermore, the topography is generally flat and without major rivers or mountains to negotiate.

Australian mining conditions are generally good. Seams are thick (1 to 30 meters) coal dips are gentle, faulting minimal, and the terrain relatively flat. Mines selling to the export market tend to be large, open-cut operation. This is required in order to have the low operating costs necessary to be competitive in the international steam coal market. Australian reserves have the geology to achieve this. Estimates indicate that by 1990 approximately 75 percent of total Australian steam exports will be mined by open-cut methods. These will be primarily dragline operations or draglines in combination with truck/shovel units pre-stripping for the later, down-dip years of a mine's life. Similarly, the size of these mines will grow to the point that 50 percent or more of them will be producing at least 3 million tonnes per year each. This provides the obvious advantages of economies of scale. Infrastructure costs tend to be higher in the more remote Bowen Basin fields, but larger mines are being developed to carry these costs.

In summary, Australia scores highly on all three factors — high quality, close proximity to deep water ports, and simple geology. But these benefits are partially offset by government rail tariffs, export duties, and the frequency of labor disputes.

South Africa

If all of South Africa's coal resources are taken into account, average quality is poor. Quality varies greatly by seam and often selective mining is used to avoid high ash bands within a seam. Some coals of the Witbank Field, however, exhibit the following raw specifications:

Heating Value	10,000	—	13,000 BTU/lb.
Moisture	11%	—	30%
Ash	20%	—	32%
Volatile Matter	50%	—	60%
Sulfur	0.5%	—	2.0%

Although quality is not South Africa's strong suit, with washing, consistency is.

One of the key advantages for South African coal is the direct rail link (completed in 1975) between Witbank and Richard's Bay. This line is electrified, handles unit trains, and is almost solely dedicated to transporting coal. Approximately 90 percent of Richard's Bay coal comes from mines in the Transvaal, which includes the Witbank Field. Fifteen unit trains run daily and the average distance covered is 500 kilometers each way. A round trip requires slightly more than two days. Future production will be located close to this line, which is undergoing expansion to handle South Africa's increased export quotas.

The greatest advantages of South African coal are its simple geology and low production costs. Briefly, this is because coal measures were formed after the local glacial period. This has resulted in the numerous independent coal basins where marshes once developed in the low-lying areas formed during the ice age. These coal formations have not been subjected to additional burial or upheaval and so are thick, flat-lying, and shallow — albeit of lower quality. The most significant structural features are dolerite dikes and sills.

As in Australia, much of the export steam coal comes from low-cost, large surface mines. The trend is clear. In 1978, 16 percent of South Africa's sales tonnage came from surface operations. In 1979, surface mining represented 23 percent, and by the early 1980s it will be around 35 percent. Mine size and mechanization is increasing. Over 88 percent of the 1980 production came from mines larger than 1 million tons per year and 55 percent from mines larger than 3 million tons per year. A list of major new mines and expansions shows individual annual production levels from 3 million tons per year to over 27 million tons per year.

South Africa will continue to be able to provide low-cost coal. This is due primarily to the low cost of production. While it is true that some of these savings are due to lower wages, the more important reasons for South Africa's advantage are the thick, shallow-lying, and flat coal deposits located along an efficient rail system within 500 kilometers of a deep water port. Note that if South African workers earned the Australian average wage of \$32.00 per year, the additional cost for the high productivity exporting coal mines would be only about \$4 per tonne. This is important, but considering that actual direct operating costs for surface mines are less than \$8 per tonne and rail transport to Richard's Bay is less than \$10 per tonne, South Africa would still be the low-cost supplier.

Canada

In 1970, 93 percent of Canadian exports were metallurgical coals shipped to Japan. Metallurgical grade coal makes up 80 percent of the country's reserves. Although these reserves are relatively low in volatile matter, they have gained some acceptance as low-sulfur thermal coal. With the recent thermal coal demand, many metallurgical properties are being developed for the thermal markets. Washing is often necessary to decrease the ash content, but coals are typically low sulfur. Qualities vary widely, but high-grade bituminous coals generally have the following characteristics:

Heating Value	11,500	—	14,000 BTU/lb.
Moisture	6%	—	8%
Ash	8%	—	20%
Sulfur	0.3%	—	0.8%
Volatile Matter	20%	—	35%
FSI	5	—	8

Transportation efficiency is important to Canada's competitiveness in the world market. The distances from coal fields to ports are generally greater than those in Australia and South Africa and the topography is *much* more difficult. Rail distance to port averages 1,100 to 1,200 kilometers to Roberts Bank on existing track for the Crowsnest Region, and the same from the Northeast or Peace River Region along both existing track and a 116-kilometer section which is under construction from Tumbler Ridge to Anzac. Using unit trains with advanced diesel-electric locomotive power and rotary dump cars, the 2200-kilometer round trip from mine to port is expected to take four days at competitive per unit tariffs. But, because of the great distances involved, transportation costs make up more than 50 percent of the delivered-to-port costs.

Western Canada coals are a good example of the conditions necessary to form higher grade coals. The heat and pressure necessary to improve grade has also created a more complex geology. These coals are heavily folded and faulted and the topography is mountainous. This increases mining costs. But the large size of Canada's mines helps to minimize these costs.

The average annual production of the six mines that exported coal from the west coast of Canada in 1981 was 3 million tonnes. The vast majority of both the existing mines and of the new projects (Bullmoose, Quintette, Quinsam, Line Creek, Greenhills, Sage Creek, etc.) are open-pit, truck/shovel operations with stripping ratios of from 3:1 to 7:1. Note the continuing predominance of large surface mines in the export market.

Colombia

Colombia is the country most often given as an example of the new sources of export coal expected in the latter half of the 1980s. This is due primarily to the Cerrejon joint development by Exxon (Interco) and Colombia (Carbocol). Other regions are also undergoing planning for development as both domestic and export producers.

Colombia has ample coal resources, which exemplifies the abundance of coal worldwide. Coal quality is generally good. Although not of top ranking due to a younger age, the coal is suitable as an export thermal coal and has a low sulfur content. Using Cerrejon as an example, the coal is high volatile A to high volatile C bituminous with a heating value of 11,800 BTUs per pound, 8.5 percent ash, 0.6 percent sulfur, and a moisture content of 9.3 percent.

Other regions in Colombia also contain vast reserves of coal with heating values of up to 13,300 BTUs per pound, ash as low as 5 percent, and moisture, again slightly high, 8 percent inherent. In general, Colombian coals are acceptable in the thermal market.

One of the advantages of Colombian coal is its proximity to tidewater. Again using Cerrejon as an example, the overland distance from mine to port is only 160 kilometers. The rail line will use two unit trains on an eight-hour turnaround to provide 15 million tons per year capacity. The route is in a broad valley with few hills or other obstacles. Since this is an undeveloped area, much of the initial investment will be for infrastructure to transport the coal and support the workforce. Only 29 percent of the \$3 billion-plus capital budget will be for actual mine construction.

Other coal regions in Colombia are also well-situated to coastal ports. A potential exists for coal barging along the Magdalena River to Barranquilla, which would be very cost effective.

Although Colombia's geology is more complex than that of Australia or South Africa, surface mines will predominate. The Cerrejon geology is representative of other Colombian coal projects. There is no severe faulting and the terrain is gently rolling. The coal seams dip steeply from 10° and 15° and are not overly thick (typically 3 to 4 meters), but are numerous. For example, Cerrejon will be mining forty seams (five or six at any one time) in two large truck/shovel open pits. Colombian seams generally dip too steeply to take advantage of a dragline's lower operating costs.

In summary, Colombia enjoys good quality coal that can be mined by large, open-pit operations located close to tidewaters. Colombia's central location will provide low ocean freight rates — especially with regard to Western Europe. Also, the strong desire of importing nations to diversify their sources is an advantage for Colombia.

United States Of America

Of the major coal exporting countries, we have chosen to examine the U.S. last since its numerous, vast, and diverse coal regions are best understood through comparison with those regions already discussed.

The major coal regions within the U.S. can be classified as:

- 1) — Midwest (Illinois, Indiana, Ohio, Kansas, Missouri, W. Kentucky)
- 2) — Texas, North Dakota, and Mississippi lignites
- 3) — West (Montana, Wyoming)
- 4) — Mountain (Colorado, Utah, New Mexico)
- 5) — East (Virginia, W. Virginia, E. Kentucky, Pennsylvania, Maryland, Alabama, Tennessee)
- 6) — Alaska

The first three regions can be excluded from the export picture due to quality and location factors. Midwest coal is typically of thermal, high sulfur (2-6 percent) quality. This, and the greater distances to tidewater (900-1,500 kilometers), make this coal of very limited exportability.

The economics for U.S. lignites are the same as for other worldwide brown coals — the quality is simply too low to justify transport over any distance.

The west region represents an interesting challenge for the United States. Vast reserves of thick, shallow, low-sulfur coal exist throughout the states of Montana and Wyoming. Mining costs are low due to large dragline and truck/shovel surface mines which have minimal stripping ratios. These coals are young and predominantly of sub-bituminous rank. The corresponding low heating values (8,000 - 10,000 BTUs per pound) and high moisture content make transportation over the 1,600 kilometers or more to west coast ports uneconomical on a delivered BTU basis. The mine mouth cost typically accounts for only 30 percent of the delivered cost or much less in the case of the extremely thick low-ratio Powder River Basin coals in northeast Wyoming. A comparison can be made with the Blair Athol Project which is currently under development in Australia's Bowen Basin. It is similar to a Powder River Basin mine with its 100-foot thick seam under flat terrain at a one-to-one overburden ratio. But Blair Athol has coal of 11,800 BTUs per pound, 7 percent inherent moisture, and is located only 250 kilometers from tidewater.

Due to the effects of orographic forces on coal formation, the coals of the mountain region of Colorado, Utah and New Mexico exhibit a better quality than other western coals. Economics on a delivered basis for the export market are marginal, however. In short, although quality is good, with 11,000 BTU, low-sulfur, low-ash coals (and some of metallurgical grade), the mining costs are higher due to more complex geology and greater burial depths. Northwestern Colorado coals are steeply dipping and heavily faulted. In Utah, where the distance to western ports is shortest, 100 percent of production is from underground mines which, although highly productive, cannot compete on pure economics with the large surface mines of South Africa and Australia. In addition, the overland transport distances are 1,100 to 1,400 kilometers. A stable supply and a means of diversification are really the only advantages for the buyer.

The two remaining regions are Alaska and the east. These regions are situated at the two extreme edges of the country. This in itself underscores the importance of transportation and, therefore, location in the viability of a coal mine.

The eastern region is the hotbed of U.S. coal exports and the source of most of the growth. This region is itself diverse, but contains regions of excellent quality thermal and metallurgical coal. Coals of 5 percent ash, 0.8 percent sulfur, and 14,000 BTUs per pound are common. High-valued, low-volatile coking coals are also found here. Transportation by rail to tidewater is inexpensive by U.S. standards. Distances of 500 kilometers have rail costs of \$12 to \$15 per ton.

As noted, top quality coals are found in more complex geology and more rugged topography. This makes eastern U.S. direct operating costs higher — as much as two to three times higher than for South African and Australian mines. The rough terrain demands smaller, more flexible surface equipment and makes much of the reserves recoverable only by underground mining. Seams are typically thin — only 30 to 50 inches. The east coast industry has a long history and is composed of hundreds of small, independently owned operations (less than 100,000 tons annual production) that cannot take advantage of economies of scale or efficient unit train transportation. Also, ports do not load from ground storage but from rail cars, which increases costs due to rail storage. These factors explain the U.S. position as the swing supplier. It is, though, a tremendously important role. The U.S. provides the best metallurgical and steam coals on the market.

In the area of new development, Alaska is receiving much attention and the reason is clear — transportation. Good quality coal is located very close to tidewater at Cook Inlet. Sulfur is low but coal is sub-bituminous with quality characteristics inferior to the majority of export coals. Cook Inlet coal is 7,000 to 10,000 BTUs per pound (rank depends on burial depth), 8 percent to 30 percent ash, and less than 0.3 percent sulfur. Much of the more than 2 billion tonnes of Cook Inlet coal can be surface-mined at low ratios. This combination of low-sulfur, low-ratio surface mining and proximity to tidewater (less than 100 kilometers) is responsible for the interest in exporting this coal. Furthermore, shipments from port are one-half to one-fourth the distance to the Pacific Rim importing countries of shipments from the east coast of North America, Australia, and South Africa.

The vast reserves in Northern Alaska (over 7 billion tons) have serious transportation problems and are located in the continuous permafrost zone.

Conclusion

This analysis has covered the coal regions bidding for the Asian export market with respect to their advantages and disadvantages prior to port loading. Coal properties are now competing on a global basis for the growing, yet demand-constrained, market for export coal. This competition is keen.

On a delivered basis, the list of major suppliers in order of increasing cost would be South Africa, Australia, Canada, and the U.S. The determination of who actually captures the market, however, is complicated by the diversity of supply objectives of consumers. A hard-line, dollars-and-cents comparison is not sufficient. For this reason, we have avoided the use of specific price quotes, which can be obtained from numerous newsletters. These will vary, as will their importance with respect to a buyer's overall objectives. What will not vary are those uncontrollable factors of coal quality, location, and mining conditions. A knowledge of these is crucial to understanding where trade routes will develop and where ports will be required.

James M. Griffin
Vice President

**CHASE MANHATTAN BANK OFFERS
1983 EDITION OF THREE ENERGY-RELATED PUBLICATIONS**

- **World Coal Outlook to the Year 2000**
- **The Energy Outlook Through 2000**
- **Petroleum Industry Investments in the Eighties**

Over the past year, there have been two significant market developments which, taken together, greatly affect the long-term expectations for energy and the energy industries of the world.

First, the continuation and deepening of the worldwide recession in 1982, coupled with a perceived change in the structure and pattern of economic development and expansion over the long term, have led to lowered forecasts of economic growth. Economic projections are now calling for a delayed recovery from the current recession and lower rates of economic growth once the recovery begins.

Second, a supply/demand imbalance in the oil market, which is the product of recession, energy conservation, energy substitution, and excess OPEC production, has led to a major weakness in oil prices, both spot market and effective non-Saudi contract prices. The potential for continued market weakness, because of the slow rate of economic growth and the inability of OPEC to control production, has led to a projection of lower oil price paths than had been forecasted previously.

In light of these developments, the Chase Energy Economics Division has updated the three energy-related publications released in 1981. The reports, the products of an integrated multi-disciplinary assessment of the world energy market, are a blend of judgment and mathematical analyses developed via a family of large-scale computerized simulation models. They are described in detail below.

World Coal Outlook to the Year 2000

The 1983 edition of the *World Coal Outlook to the Year 2000* examines the worldwide impact of lower oil prices and lower economic activity on the demand, production, and international trade in coal. The report includes detailed regional forecasts of coal demand by end-use application. Regions include the U.S., Canada, Western Europe, Japan, Other Asia, Latin America, Africa, Australia/New Zealand, Communist Europe, and Communist Asia. In addition, regional coal production forecasts are provided with a detailed analysis of regional coal trade patterns. In all instances, the changes relative to Chase's previous forecasts are shown. Because of the current situation in the oil market, the report includes an analysis of the competitive position of coal relative to oil in the generation of electricity, and in industrial steam applications. The report concludes with an examination of the impact of an oil price collapse on the international markets for coal. At present a 25 to 35 percent likelihood is assigned to this event occurring in 1983. Below we provide the Table of Contents of the study. The study is available at \$125 (U.S.), payable by check or money order to The Chase Manhattan Bank, N.A. Additional copies cost \$65 each.

(over)

World Coal Outlook to the Year 2000

Table of Contents

- Executive Summary
- Introduction
- World Economic Outlook, Oil Prices, and Coal
 - World Economic Outlook
 - World Oil Prices and the Competitive Position of Coal
- The Markets For Coal
 - Electric Power Generation
 - Industrial and Other Thermal Coal Applications
 - Steel Industry Use of Metallurgical Coal
 - Synthetic Fuel Feedstocks
- World Coal Production and International Trade
 - World Coal Import Requirements
 - The Pattern of World Coal Exports
 - Overseas Coal Trade and Shipping
- The Impact of an Oil Price Collapse on International Steam Coal Trade
- Appendices

The Energy Outlook Through 2000

The 1983 edition includes expanded detailed regional forecasts of energy demand by fuel type consistent with the latest views regarding economic growth, oil prices, and energy conservation. Major emphasis is placed on oil as the marginal energy supply with considerable analysis regarding OPEC's current dilemma in controlling production to maintain market price and sustain member countries' revenue stream. In this context, the production profiles and revenue streams of the OPEC members are examined under two oil price scenarios. The first scenario represents our 50 percentile (best estimate) forecast wherein OPEC is successful in defending the current \$34 market crude price. In the second oil price scenario a continuation of the current recession and OPEC's inability to control production results in a marker crude price collapse to \$26 in 1983. At present a 25 to 35 percent likelihood is assigned to this event. The study concludes with an assessment of the prognosis for such unconventional energy sources as nuclear fusion. The report is available for \$175 (U.S.). Additional copies cost \$85 each.

Petroleum Industry Investment in the Eighties

The 1983 edition of this report provides an in-depth analysis of the non-Communist petroleum industry's capital expenditures through 1990, updated to include actual 1980 and 1981 results and to be consistent with the current best estimate oil price forecast and its impact on industry cash flow and return on E&P investment expectations. The analysis includes regional forecasts of investment needs in exploration and production, refining, petrochemicals, transportation, and marketing. Based on these investment needs, the non-Communist world petroleum industry's credit market requirements are forecast. In addition, the report focuses in detail on the U.S. petroleum industry's projected source and use of funds. It also examines the impact of an OPEC oil price collapse scenario on capital investment and credit market requirements. The scenario used involves an \$8 per barrel drop in the marker crude price to \$26 per barrel in the second quarter of 1983. "Petroleum Industry Investments in the Eighties" is available for \$100 (U.S.). Additional copies cost \$50 each.

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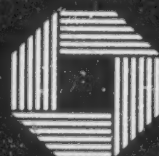
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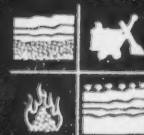
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The Coal Situation



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INTERNATIONAL COAL TRADE — 1983

There was a significant slowing in the rate of growth in coal trade in 1982. After increasing by 12.8 percent in 1980 and 5.0 percent in 1981, the volume of coal entering international trade grew by a very modest 0.9 percent, rising from 271.1 million metric tons (tonnes) in 1981 to an estimated 273.4 million tonnes in 1982. Three factors were at work in producing this slowdown in growth. These were world recession, inventory adjustments, and declining oil prices. Of the three, recession had the greatest influence, as illustrated by the decline of 4.1 percent in metallurgical (coking) coal imports, which resulted from the 3.4 percent decline in raw steel production in the major coal importing regions of the world.

In 1983, while the effects of inventory adjustments and lower oil prices will continue to be felt in the coal markets, economic activity, that is, the timing and strength of world economic recovery, will continue to play the lead role in influencing coal trade. The purpose of this issue of "The Coal Situation" is to review the international movement of coal in 1982 and to provide our outlook for trade flows for 1983. Because of the uncertainties surrounding the timing and strength of world economic recovery and the consumer's adjustments of coal inventories in light of falling prices for coal, a range of low, medium, and high forecasts are provided for metallurgical (coking) coal and thermal (steam) coal trade for 1983.

Review of 1982

As mentioned, an estimated 273.4 million tonnes of coal were imported in 1982, an increase of 0.9 percent (2.3 million tonnes) over the revised statistics for 1981. As shown in Table 1, this growth was entirely the result of continued expansion of the thermal coal segment of the market, which increased by 6.5 percent in 1982. This growth in thermal coal imports offset the 4.1 percent decline in metallurgical coal trade.

As shown in Table 1, with the exception of the Latin America and "Other" regions, a decline in metallurgical coal imports was registered in each of the importing regions of the world. These results are indicative of the breadth of the world recession and its impact on the world steel industry.

Table 2 shows the 1981 to 1982 rates of change in raw steel production and metallurgical coal imports for the major coal importing regions. For the regions shown, total steel production fell to 577.6 million tonnes in 1982 from 597.7 million tonnes in 1981, a decline of 3.4 percent. Simultaneously, metallurgical coal imports declined by 4.1 percent. Of the regions shown, the greatest decline was registered by the European Economic Community (EEC), whose members in total experienced a fall-off of 11.9 percent in raw steel production and a decline of 13 percent in metallurgical coal imports.

Despite the greater decline in the importation of metallurgical coal versus the fall-off in raw steel production, inventories remain high at key consuming regions. For instance, while the EEC reduced its imports of metallurgical coal by 13 percent, more than 1 percentage point greater than the reduction in raw steel output, the Community's inventories of coke (the product of metallurgical coal) increased by 34.2 percent, reaching 14.3 million tonnes by year-end 1982. The vast majority of this stock accumulation occurred in West Germany, where production of coke from government-supported, domestically produced coal continued despite the declines in demand in its domestic and export markets.

In Japan, the largest single importer of metallurgical coal, inventories of coal and coke also increased in 1982, as the reductions in steel output exceeded the decline in coal imports. This result is mainly explained by Japan's relatively heavy purchasing of U.S. metallurgical coals in early 1982 in anticipation of labor difficulties in Australia that in fact did not

TABLE 1
WORLD COAL IMPORTS 1981 VERSUS 1982
(Million Metric Tons)

	METALLURGICAL COAL			THERMAL COAL			TOTAL		
	1981 (R)	1982 (E)	% Change	1981 (R)	1982 (E)	% Change	1981 (R)	1982 (E)	% Change
N. America	5.3	4.7	-11.3	12.2	13.7	12.3	17.5	18.4	5.1
Latin America	4.2	5.2	23.8	0.5	0.5	0.0	4.7	5.7	21.3
EEC	30.7	26.7	-13.0	59.7	57.1	-4.4	90.4	83.8	-7.3
Other W.	12.7	11.5	-9.4	11.9	11.6	-2.5	24.6	23.1	-6.1
Europe Eastern	12.1	11.7	-3.3	18.5	23.3	26.0	30.6	35.0	14.4
Europe	65.8	64.8	-1.5	12.6	14.2	12.7	78.4	79.0	0.8
Japan	13.3	13.6	2.3	11.6	14.8	27.6	24.9	28.4	14.1
Other	144.1	138.2	-4.1	127.0	135.2	6.5	271.1	273.4	0.9
Total									

(R) REVISED

(E) ESTIMATED

TABLE 2
RAW STEEL PRODUCTION VERSUS
METALLURGICAL COAL IMPORTS

(Million Metric Tons)

	RAW STEEL PRODUCTION			METALLURGICAL COAL IMPORTS		
	1981	1982	% Change 82/81	1981	1982	% Change 82/81
Japan	101.7	99.5	- 2.2	65.8	64.8	- 1.5
EEC	126.3	111.3	-11.9	30.7	26.7	-13.0
Other						
Western, Ex. U. S.	122.5	120.0	- 2.0	33.5	32.9	- 2.1
Communist Bloc	247.2	246.8	- 0.2	14.1	13.8	- 2.1
Total	597.7	577.6	- 3.4	144.1	138.2	- 4.1

materialize. Thus, there exist significant quantities of metallurgical coal and coke inventories in the major import markets that in 1983 will displace additional metallurgical coal imports.

As stated earlier, thermal coal continued to be the one bright spot for trade in 1982. Increased imports by Canada and the continued greater use of coal in place of oil by the Japanese and other Asian consumers resulted in increased thermal coal imports by these areas.

Trade in thermal coals, however, also was affected by recession and excess inventories, as illustrated by the decline in coal imports by the EEC and other Western Europe. A major reason for this decline was the recession-induced lower rates of growth in electricity demand that, coupled with increased nuclear power generation or the working down of excess coal inventories, reduced the need for coal imports. For instance, preliminary statistics indicate that in 1982 electricity generation in France grew by 0.7 percent over 1981. Of total generation, nuclear power generation grew by 3.4 percent and hydro-electric generation declined by 2.2 percent, while generation by fossil fuels essentially was flat.

Of the power generated by fossil fuels, France increased its use of coal and decreased its use of oil and gaseous fuels. This growth in coal consumption was provided by the increased use of lignite (non-imported) and the drawing down of hard (bituminous and anthracite) coal inventories. By November, 1982, hard coal inventories at French power stations stood at 3.7 million tonnes, a decrease of 2.7 million from the inventory levels of November, 1981. While thermal coal inventories in France have decreased, stocks in other countries have remained constant or have increased slightly relative to year-end 1981. Therefore, like metallurgical coal, the readjustment of inventory positions will not significantly enhance thermal coal trade in 1983.

Table 3 shows the revised 1981 and estimated 1982 coal exports for the major international suppliers. As was anticipated last year, the most significant change in the 1982 pattern of export was the reintroduction of Polish coal onto the market. In 1982, Poland almost doubled its exports, reaching 28.5 million tonnes, versus 15 million tonnes in 1981. In absolute volumes, the United States was the most affected by the renewed availability of Polish supplies. As a result of the replacement of supplies by Poland in Europe and the increased availability of Australian and South African supplies to Asia—offset somewhat by increased exports to Canada—U.S. exports of thermal coal in 1982 declined by 3.9 million tonnes from 1981 levels. The U.S. was not the only exporter affected by the return of Poland. Export volumes also were affected in the United Kingdom, West Germany, and South Africa. South African suppliers, however, were able to partially offset the decreases they experienced in Western Europe with increased exports to the Asian market. Other than Poland, Australia was the only supplier to register significant gains in its exports of thermal coal in 1982.

Outlook for 1983

Reductions in inventory will continue to have a negative impact on coal imports in 1983, particularly in Japan and Western Europe. In addition, the fall in oil prices experienced in the first quarter of this year will tend to slow the speed of coal conversions, if for no other reason than the consumer's re-examination of the conversion decision in light of the recent developments in the oil market. The decline in oil prices will also slow the efforts by the world steel industry to reduce oil usage in the blast furnace through increased coke consumption.

While inventory adjustments and lower oil prices will influence the level of coal trade in 1983 as in 1982, the effect of these two considerations will be secondary to the influence of economic activity. For instance, lower oil prices will tend to slow the speed of coal conversions, thereby decreasing the rate of growth of coal demand. But should lower oil prices trigger economic recovery, the positive impact on electricity demand, cement manufacturing, and steel production would more than offset the negative effects mentioned above. Further, an earlier, stronger economic recovery with associated higher levels of coal consumption would lower the expected inventory drawdown in 1983. Since inventories are adjusted to reflect consumption levels, if consumption is higher, desired inventory positions will be higher.

The U.S. economy presently is showing signs of recovery, which, along with the recent significant decline in oil prices, could lead to a recovery worldwide. While lower oil prices and the beginning of economic improvements in the U.S. are positive signs for world economic recovery in 1983, the strength and durability as well as the breadth of a recovery are still subject to a great deal of uncertainty.

TABLE 3
WORLD COAL EXPORTS 1981 VERSUS 1982
(Million Metric Tons)

	METALLURGICAL COAL			THERMAL COAL			TOTAL		
	1981 (R)	1982 (E)	% Change 82/81	1981 (R)	1982 (E)	% Change 82/81	1981 (R)	1982 (E)	% Change 82/81
U.S.	59.2	59.0	- 0.3	42.8	38.9	- 9.1	102.0	97.9	-4.0
Australia	39.5	35.8	- 9.4	10.2	12.7	24.5	49.7	48.5	-2.4
South Africa	3.5	3.2	- 8.6	26.4	25.3	- 4.2	29.9	28.5	-4.7
W. Germany	7.0	4.1	-41.4	5.3	4.3	-18.9	12.3	8.4	-31.7
Canada	14.0	14.2	1.4	2.1	2.1	0.0	16.1	16.3	1.2
Other	6.2	6.4	3.2	17.9	17.2	- 3.9	24.1	23.6	-2.1
Sub Total	129.4	122.7	- 5.2	104.7	100.3	- 4.0	234.1	223.2	-4.7
Poland	3.7	4.5	21.6	11.3	24.0	112.3	15.0	28.5	90.0
U.S.S.R.	11.0	11.0	0.0	11.0	10.7	- 2.7	22.0	21.7	-1.4
Total	144.1	138.2	- 4.1	127.0	135.2	6.5	271.1	273.4	0.9

(R) REVISED
(E) ESTIMATED

TABLE 4
WORLD COAL TRADE FORECAST
(Million Metric Tons)

	METALLURGICAL COAL				THERMAL COAL				TOTAL			
	1982		1983		1982		1983		1982		1983	
	Est.	Low	Medium	High	Est.	Low	Medium	High	Est.	Low	Medium	High
Exporters												
U.S.	59.0	40.6	45.2	49.8	38.9	30.9	32.9	35.3	97.9	71.5	78.1	85.1
Australia	35.8	33.5	34.5	35.6	12.7	14.0	14.5	15.2	48.5	47.5	49.0	50.8
South Africa	3.2	2.8	3.0	3.3	25.3	25.0	25.8	27.3	28.5	27.8	28.8	30.6
W. Germany	4.1	3.5	3.8	4.1	4.3	3.5	3.5	4.0	8.4	7.0	7.3	8.1
Canada	14.2	13.8	14.0	14.2	2.1	2.2	2.6	2.8	16.3	16.0	16.6	17.0
Other	6.4	5.8	6.0	6.4	17.2	15.2	15.8	16.3	23.6	21.0	21.8	22.7
Sub Total	122.7	100.0	106.5	113.4	100.5	90.8	95.1	100.9	223.2	190.8	201.6	214.3
Poland	4.5	4.5	4.5	4.5	24.0	28.0	28.0	28.0	28.5	32.5	32.5	32.5
U.S.S.R.	11.0	10.5	10.5	10.5	10.7	11.0	11.0	11.0	21.7	21.5	21.5	21.5
Total	138.2	115.0	121.5	128.4	135.2	129.8	134.1	139.9	273.4	248.8	255.6	268.3
Importers												
North America	4.7	4.0	4.2	4.5	13.7	12.3	12.5	13.0	18.4	16.3	16.7	17.5
Latin America	5.2	4.8	5.6	6.3	0.5	0.5	0.5	0.5	5.7	5.3	6.1	6.8
EEC	26.7	18.9	20.9	22.9	57.1	52.7	54.1	55.9	83.8	71.6	75.0	78.8
Other W. Europe	11.5	9.2	10.0	10.5	11.6	10.5	11.1	11.5	23.1	19.7	21.1	22.0
Eastern Europe	11.7	10.0	10.5	11.2	23.3	23.3	24.1	25.5	35.0	33.3	34.6	36.7
Japan	64.8	54.5	56.3	58.5	14.2	15.2	16.0	17.0	79.0	69.7	72.3	75.5
Other	13.6	13.6	14.0	14.5	14.8	15.3	15.8	16.5	28.4	28.9	29.8	31.0
Total	138.2	115.0	121.5	128.4	135.2	129.8	134.1	139.9	273.4	244.8	255.6	268.3

We have attempted to bound the uncertainty that the impacts of economic recovery, inventory adjustments, and oil prices will have on the international coal markets by providing Low, Medium, and High forecasts of world coal trade in 1983. The Low forecast represents a scenario in which world economic growth and lower oil prices, the consumer continues to draw inventories down in place of new purchases. The High forecast assumes that world economies exhibit strong recovery in the third and fourth quarters of 1983, thereby increasing coal demand and minimizing the impact of inventory drawdown. The Medium forecast falls between these two scenarios, with recovery in the coal markets occurring in the second half of the year, but assumes a slower economic recovery than in the High forecast. The resulting forecasted range in coal trade for 1983 is shown in Table 4.

In the metallurgical coal markets, trade for 1983 is forecast to range between a low of 115.0 million tonnes and a high of 128.4 million tonnes. Those figures represent a decline in volume of 16.8 percent and 7.1 percent, respectively, relative to imports in 1982. The most significant contributor to the decline is Japan, which is projected to decrease its imports of metallurgical coal by almost 16 percent in the Low forecast and 9.7 percent in the High. The range in the forecast of Japanese metallurgical coal imports reflects uncertainty in the forecasted raw steel production ranging from a low of 91 million tonnes to a high of 96 million tonnes. Also reflected in the metallurgical coal forecast for Japan is an inventory drawdown of approximately 4 million tonnes.

The other major contributor to the forecasted decline in metallurgical coal imports is the EEC, whose steel industry is expected to continue to be affected by recession for most of 1983, even under the High forecast case. Under the Low forecast of coal trade, EEC steel production for 1983 falls to 101 million tonnes from 111.3 million tonnes for 1982.

Volumetrically, the United States is expected to experience the greatest fall-off in its exports of metallurgical coal as a result of the forecast decline in imports. The sensitivity of U.S. exports to worldwide economic activities reflects the volume of its exports to both the Japanese and European markets. In 1982, over 35 percent of U.S. metallurgical exports were shipped to Japan and 33 percent were shipped to the EEC.

While metallurgical coal trade is expected to decline even under a more optimistic outlook for worldwide economic

activity, only under the more pessimistic economic outlook associated with the Low and Medium forecasts does the market for thermal coal decline. As shown, thermal coal trade for 1983 is expected to range from a low of 129.8 million tonnes to a high of 139.9 million tonnes. If it were not for the expected declines in imports by the EEC and other Western European countries, trade in thermal coal would have been expected to continue to exhibit increases despite lower oil prices. The major contributor to the fall-off in European thermal coal imports is the expected work-off of excess inventories, which is stronger under the Low forecast because of the associated weaker economic recovery. Even within Europe there are positive signs of growth in steam coal imports. Greatest growth will be exhibited in Spain, Italy, and Greece.

As was the case for metallurgical coal, the United States is expected to bear the brunt of the fall-off in European thermal coal imports. Also contributing to this decline is the increased availability of Polish supplies. Increased exports by Poland, however, will be felt by the U.K. In 1982, exports by the United Kingdom declined by 2 million tonnes. With increased Polish exports in 1983, an additional decline of 2 to 3 million tonnes can be expected.

Conclusion

In 1983, the international coal markets still will be under the influence of the world recession. Most heavily affected will be international metallurgical coal trade, as the carryover of the depressed state of the world steel industry continues to be felt through at least the first half of 1983. Even in the thermal coal markets, the carryover of the current recession will serve to dampen the rate of usage of coal in power generation and cement manufacturing. Nevertheless, while declines in oil prices will tend to slow the rate of conversion to coal by the world's manufacturing and power generation sectors, it is the rate of economic recovery that will be of greatest importance in influencing the level of coal consumption and trade in 1983. With economic recovery beginning in the United States generally followed by recoveries elsewhere, coal trade volumes should strengthen over the year. It will not be until 1984, however, that the full benefits of world economic recovery will flow to the coal market, particularly for the metallurgical coal sector.

Vincent J. Calarco, Jr.
Vice President

UNITED STATES COAL BALANCES

	----- JULY THRU SEPT. -----			- CALENDAR YEAR TO DATE -		
	1982	1981	CHANGE	1982	1981	CHANGE
	Million Short Tons		- % -	Million Short Tons		- % -
Consumption						
Electric Utilities	158.47	159.11	- 0.40	449.06	448.87	0.04
Coking Plants	9.10	16.22	-43.90	32.87	45.97	-28.50
General Industry	14.65	16.20	-9.57	47.84	50.02	-4.36
Retail Deliveries	1.93	1.48	30.41	5.62	4.89	14.93
Total Domestic Demand	184.15	193.01	-4.59	535.37	549.75	-2.62
Exports	25.25	33.98	-25.69	82.43	76.78	7.36
Total Demand	209.40	226.99	- 7.75	617.81	626.52	-1.39
Supply						
Domestic Production	198.02	234.58	-15.59	630.56	585.60	7.68
Imports	0.15	0.23	-34.78	0.39	0.75	-48.00
Total New Supply	198.17	234.81	-15.60	630.95	586.35	7.61
Stock Change	-11.23	7.82	-	13.14	-40.18	-

Totals may not add due to rounding

Sources: U. S. Department of Energy
National Coal Association
Chase Manhattan Bank

EUROPEAN ECONOMIC COMMUNITY COAL BALANCES - HARD COAL

	----- JULY THRU SEPT. -----			- CALENDAR YEAR TO DATE -		
	1982	1981	CHANGE	1982	1981	CHANGE
	Million Short Tons		- % -	Million Short Tons		- % -
Deliveries to:						
Electric Utilities*	46.98	44.32	6.00	147.95	142.90	3.53
Coke Plants	21.04	23.91	-12.00	67.85	69.67	-2.61
General Industry*	5.92	6.12	-3.27	18.89	18.51	2.05
Retail Deliveries*	4.39	3.85	14.03	14.15	12.86	10.03
Total Domestic Demand	78.34	78.21	0.17	248.87	243.93	2.03
Exports	0.77	1.08	-28.70	1.98	2.86	-30.77
Total Demand	79.11	79.29	- 0.23	250.84	246.80	1.64
Supply						
Domestic Production	60.75	61.48	- 1.19	197.65	199.52	-0.94
Imports (Third-Party Countries)	18.26	19.72	- 7.40	55.83	57.52	-2.94
Total New Supply	79.01	81.21	- 2.71	253.48	257.05	-1.39
Stock Change	-0.10	1.91	-	2.63	10.24	-

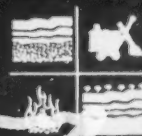
Totals may not add due to rounding

*ESTIMATED

Sources: Eurostat
Chase Manhattan Bank



The Coal Situation



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THE U. S. DOMESTIC COAL MARKETS IN 1982 AND OUTLOOK FOR 1983

In 1982, a record 756 million metric tons (tonnes) of coal were produced in the United States. While the U.S. coal industry reached a new level of output, production was only 1.2 percent greater than the strike-affected output of 1981 (747.5 million tonnes) and a mere 0.5 percent greater than the previous record year of 1980 (752.9 million tonnes). More important, while domestic production was modestly greater than previous record years, total domestic coal consumption in 1982 fell by 3.5 percent, the first decline since 1974. Further, in 1982 U.S. exports declined by 5.6 percent from the record level of 102.1 million tonnes traded in 1981. (See *The Coal Situation*, Vol. 3, No. 2, May 1983 for a discussion of U.S. coal trade.)

As a result of the decline in domestic consumption and exports versus the modest growth in production, coal inventories increased. As of December 31, 1982, consumer inventories stood at 177.1 million tonnes, an increase of almost 9.1 million tons over year-end 1981. At the point of production and distribution, year-end 1982 inventories reached 33.4 million tonnes, an increase of 11.5 million tonnes over year-end 1981.

The purpose of this issue of *The Coal Situation* is to examine in greater detail the performance of the U.S. domestic coal markets in 1982 and to review the outlook for 1983. In developing this review, national average statistics are utilized. While national statistics provide an indication of the general overall situation for coal, the reader is reminded that the U.S. coal markets and industry are geographically quite diverse. National statistics will therefore tend to distort or mask important regional differences. Unfortunately, the limited space available in this publication does not permit a detailed regional examination of the U.S. coal markets.

1982 U.S. Domestic Coal Consumption

The real story behind the performance of the U.S. coal markets in 1982 was recession. Last year, the U.S. real gross national product (GNP) declined by 1.7 percent, while industrial production declined 8.1 percent. One illustration of the severity of recession as it relates to coal is the U.S. steel industry, which by year-end was operating at less than 40 percent of productive capacity, the lowest level of capacity utilization since the Great Depression. For the year, U.S. raw steel production fell to 66 million tonnes, a decline of 40 percent from 1981, the lowest level of output since 1946. Further, for the first time since the 1930s, the nation's production of electricity declined, falling from 1,203 billion kilowatt-hours in 1981 to 1,192 billion kilowatt-hours in 1982.

The impact on the coal markets of the fall-off in industrial activity, raw steel production, and electricity generation is illustrated in Table 1. Needless to say, because of the dramatic decline in the production of raw steel, the consumption of metallurgical coal in the nation's coke plants has been the most negatively affected market for coal in 1982. As shown in the table, the consumption of coal at U.S. coke plants declined by 33 percent (18.3 million tonnes) from the level consumed in 1981. This decline represented almost 80 percent of the 23 million tonne decline in total domestic coal consumption between 1981 and 1982. Volumetrically, the remainder of the fall-off in the nation's use of coal in 1982 was evenly split between the electric utility and general industry segments of the market, with the declines in these markets offset to a very minor extent by the increased use of thermal coal in the residential and commercial sector for space and water heating.

TABLE 1
U.S. DOMESTIC COAL CONSUMPTION* 1982 VERSUS 1981
(Million Metric Tons)

	1981	1982	Percent Change 1981 — 1982
Electric Utilities	541.6	538.7	- 0.5
Coke Plants	55.4	37.1	-33.0
General Industry	61.2	58.4	- 4.6
Residential/Commercial	6.7	7.4	10.5
Total	664.9	641.6	- 3.5

* Includes anthracite, bituminous, subbituminous, and lignite.

Source: U.S. Department of Energy, *Quarterly Coal Report*, April, 1983.

Electric Utility Coal Consumption

Of the declines in coal consumption shown in Table 1, the fall-off in electric utility consumption is of most interest. Unlike the coke plant sector (where consumption has fluctuated up and down with variations in raw steel production, changes in steel-making technology, and the imposition of environmental controls), or the general industry sectors (where coal consumption has fluctuated with economic activity and availability of cheaper, cleaner alternative energy sources), the decline in 1982 of coal consumption for power generation was the first registered in 25 years. This is despite the availability of cheap oil and natural gas in the 1960s, the introduction of nuclear power in the 1970s, and the imposition of stringent environmental standards.

In the 1960s and through the mid-1970s, U.S. electricity demand per dollar of GNP increased steadily, from a level of

0.93 kilowatt-hours per dollar of real GNP in 1960 to 1.44 kilowatt-hours per dollar of real GNP by 1975. Together, the increased electrification of the economy and the relatively vibrant economic growth rates in the 1960s resulted in electricity demands growing at a compound average rate of 7.3 percent per year up through 1973. To meet these demands, the electric utility industry expanded its use of all energy forms capable of economically producing electricity.

But by 1973-74 this situation changed dramatically. Largely as a result of the oil price shocks of 1973-74 and 1979-80, rates of growth in real economic activity diverged from history. In addition, the real cost of producing and distributing electricity increased sharply. This increase in costs focused attention on energy efficiency and conservation, thus erasing any growth in electricity consumption per dollar of GNP. Combined, the net effect was a dramatic decline in the rate of growth in electricity demand, falling to a compound average rate of increase of 2.2 percent per year between 1974 and 1982.

Through this period of decreased rates of growth in electricity demand and production, the use of coal for power generation increased at the expense of oil and natural gas due to the increased cost of both fuels and various forms of legislative action limiting their use. By 1982, however, the length and breadth of recession and its influence on electricity demands, coupled with the completion of nuclear units planned during the days of higher electricity demand growth rates and the increased availability of hydroelectric generation, negatively affected the use of coal.

Table 2 shows a comparison of U.S. electric utility power generation by primary energy source. Between 1981 and 1982, as mentioned previously, hydroelectric and nuclear power facilities registered increased production. Of the other major forms of power generation represented by fossil fuels, petroleum registered the greatest declines in both absolute (-59 billion kilowatt-hours) and percentage terms (-28.6 percent). Next came natural gas-based power generation, which declined by 41 billion kilowatt-hours or 11.9 percent between 1982 and 1981. Coal generation declined by 11 billion kilowatt-hours or 0.9 percent.

TABLE 2
U.S. ELECTRIC UTILITY POWER GENERATION
(Billion Kilowatt-hours)

	1981	1982	Percent Change 1981 - 1982
Coal	1,203	1,192	- 0.9
Petroleum	206	147	-28.6
Natural Gas	346	305	-11.9
Nuclear	273	283	3.7
Hydroelectric	261	309	18.4
Other	6	5	-16.7
Total	2,295	2,241	- 2.4

Source: U.S. Department of Energy, *Quarterly Coal Report*, April, 1983.

The importance of recession in contributing to the reduction in the use of coal in power generation is illustrated in Table 3, which shows, by end use, the compound average annual growth rates in electricity sales for the period 1974 through 1982 and between 1981 and 1982. As shown, the growth in electricity sales in 1982 was significantly lower in all sectors relative to average rates of growth between 1974 and 1982.

While price-induced conservation undoubtedly contributed to the divergences shown, income effects and reduced levels of commercial and industrial activity because of recession have contributed heavily. This is particularly true in the industrial sector, where electricity sales in 1982 were 9.8 percent lower

than in 1981. If this sector's purchases of electricity had remained constant at 1981 levels, an additional 80.8 billion kilowatt-hours of electricity would have been produced and sold. Total electricity sales in 1982 would then have registered a positive increase of 0.9 percent rather than the negative 2.8 percent actually achieved. In order for coal-fired electricity generation (and therefore coal consumption) to have remained constant at 1981 levels, coal-fueled power plants would have had to generate only 13.9 percent of the additional 80.8 kilowatt-hours of electricity. If the entire quantity had been generated using coal, coal-based production would have increased by 5.8 percent rather than decreasing by 0.9 percent and coal consumption (assuming a heat rate of 10,457 BTU per kilowatt-hours and heat content of 23.24 million BTU per metric ton) would have increased by 31.1 million tonnes rather than declining by 2.9 million tonnes as it did between 1981 and 1982.

TABLE 3
COMPOUND AVERAGE ANNUAL GROWTH RATES
IN ELECTRIC SALES BY END-USE SECTOR
(Percent Per Year)

	Residential	Commercial	Industrial	Other*	Total Sales	Losses	Total Product
1974-82	3.0	4.0	1.1	5.0	2.6	-0.5	2.3
1981-82	1.0	2.3	-9.8	0.9	-2.8	4.9	-2.4

*Street lighting and transportation uses.

Source: U.S. Department of Energy, *Monthly Energy Review*, May, 1983.

Coal's Share of the U.S. Energy Markets

As was shown in Table 1, with the exception of the residential/commercial sector, the consumption of coal in 1982 decreased in each market sector. While declining in absolute terms, however, the relative share of coal in meeting the nation's primary energy needs increased in each major market.

Table 4 shows, by end-use sectors, the percentage change between 1981 and 1982 of each sector's total primary energy consumption (excluding electricity and distributed electrical energy losses) and the percentage change in the consumption of coal. As shown in the table, the consumption of coal (as measured by its heat content) either increased at a greater percentage change (residential/commercial sector) or decreased at a smaller percentage decline (general industry and electric utilities) than did the consumption of total primary energy. The net result, as shown in Table 5, is that coal's share of each sector's total primary energy needs increased. Even with the inclusion of the 33 percent decline in the use of coal in the coke plant sector, coal modestly increased its share of the nation's total primary energy needs.

TABLE 4
1981-82 PERCENTAGE CHANGE IN U.S. TOTAL
PRIMARY ENERGY AND COAL CONSUMPTION BY SECTOR
(Percent Growth)

	Residential/ Commercial	General Industry*	Electric Utilities	Total**
Total Primary Energy	1.3***	-10.4***	-2.2	-4.3
Coal	9.1	-4.6	-0.5	-4.1

* Excluding Coke Plants.

** Including Coke Plants.

*** Excluding electricity sales and distributed electrical energy losses.

Source: U.S. Department of Energy, *Monthly Energy Review*, May, 1983.

TABLE 5
COAL'S SHARE OF TOTAL U.S.
PRIMARY ENERGY CONSUMPTION
(Percent of Total)

	Residential/ Commercial	General Industry**	Electric Utilities	Total***
1981	1.9*	9.3*	51.0	22.48
1982	2.0*	9.8*	51.8	22.51

* Excluding electricity sales and distributed electric and energy losses in the Residential and Commercial and General Industry sector.

** Excluding Coke Plants.

*** Including Coke Plants.

Source: U.S. Department of Energy, *Monthly Energy Review*, May, 1983.

Outlook for 1983

As is evident in the preceding review of U.S. domestic coal consumption in 1982, the key to the outlook for the coal markets in 1983 is economic recovery. Since the beginning of the year, the U.S. economy has shown many signs of recovery. In fact, the experience to date in the U.S. economy has led to increases in the expectations of U.S. economic growth rates in 1983 by the Reagan Administration and many private sector economists. Presently many economists are calling for a 5 percent or greater real growth in U.S. GNP as measured from fourth-quarter 1982 to fourth-quarter 1983. On a year over year annual basis, forecasts of the rate of growth of U.S. GNP for 1983 generally range between 2.5 and 3.3 percent.

The start of the U.S. economic recovery and the signs of a strengthening of real economic growth rates through the remainder of the year provide positive indications of improvements in the U.S. domestic coal markets. There are, however, a number of factors affecting the markets for coal which, when taken on an annual basis, will tend to offset the benefits derived from general economic recovery.

For instance, weather plays a major role in influencing the level of electricity demands and production. The winter and spring months of 1983 were both warmer and wetter than normal. Warmer weather meant lower electricity usage while the higher levels of precipitation resulted in higher levels of hydroelectric generation. For the remainder of the year, weather will continue to influence both total electricity demand and availability of hydroelectric power. A very warm, dry summer would increase electricity demands and decrease availability of hydropower, thus increasing the need for generation from other energy forms including coal. The opposite weather pattern would produce the reverse.

In addition, while recovering from the low point of 1982, steel production and general economic activity through the first quarter were lower in absolute terms than the corresponding period of 1982. Even though there is strong evidence for increasing strength in these sectors as the economic recovery accelerates, the yearly growth will be offset by the weakness of the first quarter of the year. In general, growth in steel production tends to lag growth in the economy as a whole.

Dependent upon summer temperatures, the strength of the general economic recovery in the third and fourth quarters, and the degree of steel recovery, total U.S. coal usage in 1983 could range from a low of 638.6 million tonnes to a high of 663.6 million tonnes. By market sector, the range of uncertainty for electric utility usage is 537 to 555 millions tonnes, while coke plant consumption could vary between 36 and 40 million tonnes. Coal usage in the general industry and residential/commercial sectors is forecasted to be between 65.6 and 68.6 million tonnes in 1983.

Taking into account the above considerations, our Best Estimate of the U.S. 1983 domestic coal consumption is provided in Table 6. Overall, coal consumption is forecasted to increase by a very modest 1.3 percent, reaching 649.8 million tonnes in 1983. This modest yearly growth, however, will be masking an acceleration in coal use as the year progresses. For instance, preliminary statistics indicate a decline of 3.6 percent in electricity generated by coal in the first quarter of 1983 relative to the first quarter of 1982. This implies a decline of 7.1 million tonnes in coal consumption. Therefore, to achieve the projected yearly consumption of 543.4 million tonnes in 1983, the U.S. electric utility industry is forecast to increase its usage by 11.8 million tonnes in the second through fourth quarters.

TABLE 6
FORECAST OF U.S. 1983 DOMESTIC COAL CONSUMPTION
(Million Metric Tons)

	1982	1983 Forecast	Percent Change 1983 / 1982
Electric Utilities	538.7	543.4	0.9
Coke Plants	37.1	38.4	3.5
General Industry	58.4	59.4	1.7
Residential/Commercial	7.4	7.6	2.7
Total	641.6	649.8	1.3

Vincent J. Calarco, Jr.
Vice President

UNITED STATES COAL BALANCES

	----- OCT. THRU DEC. -----			ANNUAL		
	1982	1981	CHANGE	1982	1981	CHANGE
	Million Short Tons		- % -	Million Short Tons		- % -
Consumption						
Electric Utilities	145.04	147.93	- 1.95	593.67	596.80	- 0.52
Coking Plants	8.04	15.04	-46.54	40.91	61.01	-32.95
General Industry	16.48	17.37	- 5.12	64.32	67.39	- 4.56
Retail Deliveries	2.52	2.53	- 0.40	8.14	7.42	9.70
Total Domestic Demand	172.09	182.87	- 5.89	707.03	732.62	- 3.49
Exports	23.84	35.77	-33.35	106.27	112.55	- 5.58
Total Demand	195.93	218.65	-10.39	813.31	845.17	- 3.77
Supply						
Domestic Production	196.35	238.18	-17.56	833.41	823.78	- 1.17
Imports	0.23	0.30	-23.33	0.74	1.05	-29.52
Total New Supply	196.58	238.48	-17.57	834.16	824.83	1.13
Stock Change	0.65	19.83	-	20.84	-20.35	-
Totals may not add due to rounding						
Sources: U. S. Department of Energy National Coal Association Chase Manhattan Bank						

EUROPEAN ECONOMIC COMMUNITY COAL BALANCES - HARD COAL

	----- OCT. THRU DEC. -----			ANNUAL		
	1982	1981	CHANGE	1982	1981	CHANGE
	Million Short Tons		- % -	Million Short Tons		- % -
Deliveries to:						
Electric Utilities*	55.14	51.78	6.49	203.06	194.68	4.30
Coke Plants	19.87	24.00	-17.21	88.01	93.67	- 6.04
General Industry*	6.53	7.46	-12.47	25.35	25.97	- 2.39
Retail Deliveries*	4.39	5.00	-12.20	17.98	17.86	0.67
Total Domestic Demand	85.94	88.24	- 2.61	334.41	332.17	0.67
Exports	0.90	1.14	-21.05	2.91	4.00	-27.25
Total Demand	86.84	89.38	- 2.84	337.33	336.18	0.34
Supply						
Domestic Production	68.19	71.19	- 4.21	265.84	270.71	- 1.80
Imports (Third-Party Countries)	20.29	19.91	1.91	76.64	77.43	- 1.02
Total New Supply	88.48	91.10	- 2.88	342.48	348.15	- 1.63
Stock Change	1.65	1.72	-	5.16	11.96	-
Totals may not add due to rounding						
*ESTIMATED						
Sources: Eurostat Chase Manhattan Bank						